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Raw Products Research Activities

Georgia Conducts Field Studies with Farmers and Laboratory Work at Main Station

The work of the Georgia Experiment Station has continued in close cooperation with other State and federal agencies, as well as with the farmers and food processors of the State. Much of the field work is done in cooperation with the farmers while the laboratory work is done at the main station located at Experiment.

The Piedmont Cooperative Land Use Area, containing approximately 14,000 acres and located in Putnam County, is used for making application of results of the work of the experiment station, and to increase new crops, as well as for types of research suited to that section.

Disease control on tomato seedlings

It has been demonstrated by both greenhouse and field tests that spores of the fungus causing macrosporium blight and stem canker of tomatoes do not survive on dry seed until the second season after harvest. The seed apparently are free of viable spores at 11 or 12 months after harvest, provided no later infection occurred. Since the second-season planting is about 20 months after seed harvest, the seed may be considered safe for planting at this time.

Treatments to free tomato seed of spores of macrosporium indicate that the organic mercurial, New Improved Ceresan, is effective at the rate of 1½ ounces per bushel (¾-ounce to 15 pounds), covered at least one day. After a year's storage there is less injury to germination by the 1½-ounce rate than by the 2-ounce rate previously recommended.

New Improved Semesan Jr. at nine ounces to the bushel, covered one day or more, gives good control of seed-borne macrosporium and is easier to measure for small quantities of seed. For very small seed lots, a slight excess of this dust may be shaken with the seed, then the seed sifted over 16-mesh window screen for one minute. Approximately the right quantity remains on the seed.

Root rot of snap beans

Progenies of nearly 1,000 crosses, including several double crosses, are being grown at Experiment and in cooperation with the Georgia Coastal Plain Experiment Station at Tifton. They are being selected for type and for resistance to root rots, nematodes, and other serious diseases. Several of the hybrid strains show marked resistance to root-knot nematode and some forms of root disease.

Sweet potato variety test

Forty-nine varieties of sweet potatoes were set on May 10, 1940, and harvested on October 21. For the most part the test consisted of varieties and seedlings promising for starch, but several were those generally used for table stock. The highest-yielding variety in the entire test was Wennop, which produced 236 bushels per acre. Porto Rico, the standard table variety in the South, ranked twenty-fifth in yield with 146 bushels per acre. Some of the varieties and seedlings show great promise from the standpoint of yields, others are much higher in carotene, and still others are higher in starch than anything that is to be found on the market today.

Dates of planting and spacing

Of the two varieties used in this work, namely Porto Rico and Triumph, the latter out-yielded the former by about 10 bushels per acre under all of the five dates of planting and six different spacings. In general, the highest yields of U. S. No. 1 grade potatoes of both varieties were obtained from plants spaced 12 inches apart and set on April 28—the second earliest planting. As the dates of planting progressed at 20-day intervals through June 23, the yields of all marketable grades decreased rapidly.

Booster solutions in transplanting pimiento plants

A test was set up under field conditions in the spring of 1940 to study the effect of using a "booster" or "starter" solution (four pounds of a mixture of two parts of ammophos and one part of nitrate of potash dissolved in 50 gallons of water) at transplanting time on the stand obtained and the yield of pimiento plants. Like plats also were set up in which plain water was used in the transplanting operations. A basic application of 600 pounds per acre of an 8-8-6 fertilizer was applied in the row and mixed well with the soil several days in advance of setting the plants.

The results of this work, although they are for only one year, show a 10 per cent better stand of plants and a gain over the check of 456 pounds of fruit as a result of the "booster" solution treatment. This work is being continued and will have to be conducted over several seasons before any definite recommendations can be made as to the use of this material for pimientos.

Reference: Fifty-third Annual Report, Georgia Experiment Station, Experiment.

Spinach Growing in Delaware

Special instructions for growing spinach for canning in Delaware have just been made available by the Agricultural Experiment Station in that state. Soil preference, the place of spinach in rotations, cultural and harvesting directions are discussed, as well as the adaptability of certain varieties.

Reference: Spinach Growing in Delaware, Hort. Pamphlet No. 3, Delaware Agricultural Experiment Station, Newark.

Iowa Reports on Direct-Seeded Tomato Results and Hybrid Sweet Corn Performance

The Vegetable Crops Subsection of the Iowa Agricultural Experiment Station has just made public the results of recent studies of canning crops. Of particular interest to canners is the comparison of direct-seeded tomatoes with southern and home-grown plants, the performance of hybrid sweet corn strains, comparison of sweet corn planting dates, tests of lima bean varieties, and pumpkin breeding studies.

In the comparison of direct-seeded tomatoes with southern and home-grown plants, the same strain of seed of each variety was used for three treatments. Direct-seeded plants of any single variety produced as much fruit as home-grown plants of the same variety. Comparing direct-seeded, home-grown and southern plants, there were no significant differences in any treatment in the Indiana Baltimore variety but southern plants of the Harris Early Stone variety produced more fruit than the direct-seeded plants.

Direct-seeding in two out of three years produced as much fruit as southern plants. Direct-seeding is satisfactory if the seed is sown early (April 15), if the seed is treated, and the ground well prepared. After plowing or harrowing, a planker or Meeker harrow should be used to make a fine textured seed bed. Direct-seeding may not be satisfactory if the seed is sown in soil prepared as is usual for corn or tomato plants.

In 1941, 16 golden hybrid strains and 16 white hybrid strains of sweet corn were planted from seed stocks submitted by canners who wished to have an accurate comparison made of their seed stocks with those of other canners and seedsmen. In general, yields were satisfactory. The corn was planted on soil of lower fertility than in 1940 and yields were slightly less. Gold Rush, a new hybrid, is earlier than Goldencross and Ioana but produces less corn. Marcross C6-13 is also earlier and produces less corn.

In 1939 and 1940 there were several strains of Goldencross with a comparatively large percentage of 8-rowed ears in them. In 1941, only one sample had very many present. A large number of 8-row ears in Goldencross results in a reduction in yield.

In the white strains an open-pollinated variety was used as comparison. The yield was satisfactory, but the uniformity of maturity and ear-size was much less than in a good hybrid. The cutting percentage was poor, in fact, the worst feature in the open-pollinated variety.

The results are summarized in a table showing variety, seedsman, canning company submitting seed, anther color in Goldencross strains, yields, total days silking, per cent silked in seven days, cutting per cent for usable and total ears, and row number.

In the comparison of sweet corn planting dates, the report records results of seven different planting dates from May 1 to June 12 for five hybrids and one open-pollinated strain of sweet corn. Yields and number of days to maturity are reported for each planting date and each variety. All strains decreased in yield significantly when planted in June. Kingscrost J9 and Iogent 27 declined in yield; more so for June plantings than the others although there was a slight drop in yield for all of them. Silvercross produced more corn than any of the others for the first three planting dates. This may account for the low yields secured with Silvercross in the other trials. The planting date for Silvercross in those trials would correspond to the fourth planting date in the trials which were next to the poorest.

In the lima bean variety test, ten varieties of lima beans planted on May 20 in five replications were compared for total yield and number of beans per pod. Of the canning types, Early Baby Potato was highest in yield, Baby Potato second, Fordhook third, U. S. No. 2 fourth, and Henderson Bush fifth.

Progress is reported in breeding of cheese pumpkin. This work was started in 1938. Considerable uniformity of fruit size, shape, color of skin and flesh is now evident in some of the inbred lines. The ultimate goal will be a pumpkin with the desirable characters mentioned above and total solids and/or starch content of the flesh to obtain the desired consistency of the canned product without resorting to blending with other varieties as is frequently practiced now.

Reference: "Vegetable Canning Crops"—Results in 1941, Leaflet IV, Iowa Agricultural Experiment Station, Ames.

Louisiana Tests Bean and Pepper Fertilizers; Sweet Potato and Tomato Varieties

Experiments of interest to canners, conducted at two substations of the Louisiana Agricultural Experiment Station, one located at Hammond, and the other at Calhoun, recently have been reported. Included are the results of fertilizer tests for beans and peppers, and tomato and sweet potato variety and fertilizer tests.

Pepper fertilizers

The fertilizer tests which were conducted with peppers during the 1939 season and which involved varying ratios of the three major elements, nitrogen, phosphorus and potash, showed that the most economical yield was produced from the use of the formula 4-12-4. All ratios were applied at the rate of 1,200 pounds per acre.

Bean fertilizers

During 1939, 12 treatments applied at the rate of 800 pounds per acre and the control were used in a fertilizer test with market beans on duplicate areas, one of which had been limed with dolomitic limestone at the rate of one ton per acre in 1937. Data from this test for the period 1937 through 1939 are given in a table.

The results show that two per cent nitrogen produced the largest increase in yield, with a corresponding reduction in yield when greater ratios were applied. Increases in phosphorus produced corresponding increases in yield up to the formula 4-16-4, which was the greatest ratio of this element used in the test. The use of four per cent potash produced the largest yields and most economical returns.

Tomato variety test

Marglobe gave the highest yield for a two-year period, and Louisiana 6-1-1 and Louisiana Gulf State ranked next in productiveness. The Marglobe is the standard variety for this and other sections of the State.

Tomato fertilizer tests

Results of a five-year test, given in a table, indicate that applications of 800 pounds of 4-12-4 and 200 pounds of

nitrate of soda as a side-dressing gave the most profitable per acre returns for tomatoes.

SWEET POTATO VARIETY TEST

Over the five-year period 1936-1940, Porto Rico Unit 1 gave the highest yields and local Porto Rico ranked second, as shown in a table. The Porto Rico Unit 1 was selected by Dr. Julian C. Miller of the Central Station, Baton Rouge, for its ability to produce high yields of uniform No. 1 potatoes. Selection work with the local Porto Rico has been under way during the past few seasons and as a result this strain has ranked high during the past few years.

SWEET POTATO FERTILIZERS

The fertilizer data show that the use of 400 pounds of 4-12-4 gave 53 bushels of potatoes more than the unfertilized plot.

Reference: Biennial Report of the Fruit and Truck Experiment Station, Hammond, La., 1939-40; Biennial Report of the North Louisiana Experiment Station, Calhoun, La., 1939-40.

Studies of Pea Aphid Control, Soybean Yield, and Snap Bean and Spinach Fertilizers

Among the reports distributed at the Maryland Canning Crops School in January are several of interest to canners and growers in other sections besides Maryland.

In a report on aphid control, four consecutive years of experimental work is summarized (1938 to 1941 inclusive). Plots treated with derris spray consistently outyielded untreated plots even in the years of drought—1939 and 1941, and under 1940 conditions of heavy root rot infection. The increase in yield always was sufficient to repay the cost of treatment. When aphid infestation appears early, and when ample rain falls, great returns for the treatment can be expected.

The best kills of aphids were obtained during the seasons of ample rainfall—1938 and 1940, and poorest kills were obtained in dry seasons. There does not appear to be any relation between temperature or the extent of aphid population at the time of treatment and the kills of aphids secured. The observations are not sufficient to furnish conclusive evidence regarding the cause of the variation of results secured, but they do suggest profitable work in the future.

A report on edible soybeans records yields, percentage of beans to pods and days from planting to harvest of 10 varieties tested in 1940 and 1941. Examination of yields of shelled beans shows for 1940 that Higan outyielded all other varieties and that Imperial, the second highest yielder, did not significantly differ from Emperor and from Willomi, but was significantly higher than any of the other varieties except Higan.

For 1941, Bansei and Willomi, with yields of shelled beans approximately the same, are significantly higher than any of the other varieties. Toku and Hokkaido, which might be considered in the second high yielding group, are significantly higher than any of the other varieties except Bansei and Willomi.

The higher yields of 1941 may be accounted for by the fact that the land on which the crop was grown was of a higher fertility level than that used the previous year and the season also appeared to be more suitable.

Included also are two tables showing how judges ranked the canned samples in color, character of liquor, flavor, and maturity in 1940 and 1941. This shows that in 1940 Emperor was significantly higher in quality than any of the others. Bansei, Higan and Giant Green fall into a second group and are not significantly different from each other. A third group is composed of Toku, Jogun, Imperial and Hokkaido, which are not significantly different from each other. Willomi is significantly lower than any of the other varieties.

According to the average score of the 16 judges the poorest color was exhibited by the canned sample of the variety Willomi; the poorest character of liquor by Imperial; the poorest flavor by Jogun, and the poorest maturity rating by Toku and Willomi.

In 1941 the variety Emperor again scored highest in quality and is significantly higher than Imperial, Sousei and Bansei, but is not significantly higher than the other six varieties.

While Emperor ranked highest in the average score for all items it was equaled in the score for color by Toku; exceeded all other varieties in character of liquor (which is a very important item to be considered in evaluating the quality of canned samples of this product); was slightly exceeded in flavor by Jogun and Sousei; and was second in maturity rating, in which item Jogun received the best score.

According to the average scores of the 13 judges of the 1941 samples, the poorest color was exhibited by Bansei; the poorest character of liquor by Sousei; the poorest flavor by Toku, and the poorest maturity rating by Toku.

A discussion of fertilizers and green manures for snap beans and spinach emphasizes the problems raised by war shortages of certain fertilizers and the increased necessity of fullest possible use of green manures in maintaining soil fertility. Results of bean fertilizer and placement tests in eastern Virginia are given, leading to a general recommendation of a 3-12-6 fertilizer at the rate of 1000 pounds per acre, with additional nitrogen at blooming time if needed.

A spinach fertilizer schedule is included based on whether phosphorus and potash are low, medium, or high, as shown by soil tests.

References: Some of the results of the Pea Aphid Control Investigations in Maryland by L. P. Ditman, C. Graham and E. N. Cory, and Yield and Quality Tests of Edible Soybeans Grown for Canning in Maryland; University of Maryland Agricultural Experiment Station, College Park, Md.; Fertilization and Green Manure Practices for Snap Beans and Spinach, by H. H. Zimmerley, Virginia Truck Experiment Station, Norfolk, Va. Copies of the above are available to members on request to the Raw Products Bureau.

Five-year Tomato Yield Records in New York

The acreage of tomatoes grown for canning in New York State is found largely within the limits of 14 counties in upstate and western New York and a 5-year yield record of the varieties which respond with profitable yields to the soils and climate of this area has been kept by the New York Agricultural Experiment Station at Geneva. The results recently were published.

From descriptions and yield records taken in trial grounds and observations made in commercial fields, the main characteristics wherein the varieties tested differ can be summarized as (1) season of maturity, (2) size and growth

habit of plant, (3) number of blossom clusters and fruit per cluster, (4) size and shape of fruits, (5) color of fruits, and (6) quality.

Of great importance to a high total yield is the ability of the plant to produce fruits early, in midseason, and late in the season. To do this a strong plant with abundant foliage persisting into late September is required. To produce 12 tons of marketable fruit, one acre planted at the rate of 3,000 plants must yield an average of 26 fruits per plant averaging five ounces.

A table shows the yield of the nine varieties tested at the Canning Crops Farm to September 1, from September 1 to 10, September 10 to close of the season, and total yield.

It is pointed out that long experience and trial is necessary to determine which of the above varieties or strains will do best in a particular locality on given soil types in each section.

Reference: Farm Research, N. Y. State Agricultural Experiment Station, Geneva. Jan. 1, 1942. Copies available to members on request to the Raw Products Bureau.

Wilt, Early Blight not Transmitted by Good Tomato Seed

The possibility of important transmission of early blight and fusarium wilt of tomatoes through the use of seed from tomato fruits suitable for juice and puree manufacture was found to be extremely remote, even though the fruits were sorted from crops infected with these diseases. No seeds internally infected with early blight were found among 15,590 extracted commercially from such tomatoes and only two were found among 5,659 plated from seed lots from cull fruits and portions of fruits showing abundant early blight infection. No internal infection by wilt was demonstrated in 20,207 seeds from commercial lots saved from seed-production fields containing wilt-infected plants.

Reference: The Importance of Seed Transmission of Early Blight and Fusarium Wilt of Tomato. Phytopathology, January, 1942.

Maryland Sweet Corn Field Trials, 1941

The results of sweet corn variety trials conducted by the Maryland Agricultural Experiment Station were distributed in mimeographed form at the canners school held at College Park in January. One hundred seed stocks were compared and records were taken for length of growing period, premature death due to disease, size of plant and ear, husk and cull loss, and yield of ears per acre as well as yield per plant at the canning stage of maturity.

The best yields were made by experimental white hybrids using Maryland inbred H84 as one parent. C63xH84, (A.S.G.14x5)xH74, and Evergreen xH84 were outstanding. The latter two also have good three-year records. In general canning quality they appeared to be equal to the majority of Evergreen hybrids. However, all three experimental hybrids had slightly tougher pericarps than did the commercial hybrid, 14x5(A.S.G.).

In the white Country Gentleman group Iogent 27 had the highest yield at College Park, while Hybrid 75 (Cal. P.) was high at Ridgely. Both also have good three-year records at the former place. Hybrid 75 and Illinois 8x6 have been outstanding for low husk-cull losses. Both appear quite satisfactory as to kernel type. Although Iogent 27 has been productive its coarseness and shallowness of kernel have been detracting features.

Several very productive golden Country Gentleman hybrids seemed to be deficient in kernel quality.

Golden Cross Bantam added another year to its record for superior performance. It has few rivals.

Ioana had about the same yield level as Golden Cross Bantam. It had more exposed ear tups and the kernels were somewhat lighter in color.

Reference: "Sweet Corn Field Trials, 1941," Miscellaneous Publication No. 4, Maryland Agricultural Experiment Station, College Park. Copies available to members on request to Raw Products Bureau.

New York Bean Variety Trials, 1941

At the recent Canners School at the New York State Agricultural Experiment Station, Geneva, a report was made giving the results of snap bean variety trials carried on last year. The report as distributed is a single-page, mimeographed tabulation showing yields of each variety in pounds per acre for each picking and total tonnage per acre for the season.

The trials included such Refugee types as U. S. No. 5 and Sensation, together with a number of hybrids not yet in commercial production. Wax pod varieties include Brittle Wax and a number of new hybrids. Included also are yield tabulations for several strains of Blue Lake.

Reference: Variety Snap Bean Trials, 1941. New York State Experiment Station, Geneva. Copies available to members on request to the Raw Products Bureau.

Study of Effect of Sulphur Residue

War-time problems of agriculture and food production were discussed at the recent two-day annual conference of canners at the Colorado State College. In the mimeographed report of this meeting, just issued, the following discussions are of particular interest to canners: Effect of sulphur residue on the keeping qualities of canned tomato juice; tomato fruit worm control; and studies of varieties of peaches for canning.

It is necessary to treat most of the tomatoes grown in Colorado for the control of tomato psyllid. Three materials have been recommended in Colorado Experiment Station Bulletin 454. These are lime-sulphur, wettable sulphur, and dusting sulphur. All of these leave a sulphur residue that some have feared might affect the keeping quality of the canned products.

In order to ascertain whether there is a problem, an exploratory project was started in the fall of 1940. Thirteen days before picking, one plot was treated with liquid lime-sulphur, one gallon to 80 gallons of water, plus four pounds of wettable sulphur to the 80 gallons, and another plot was treated with dusting sulphur. This fruit, as well as untreated fruit, was followed through the factory, and canned samples of the juice were taken. Twenty-one days after this first application and just one day before the next picking, these same plots were given a second treatment and the fruit handled in the same way. All fruit was given the customary washing and handling at the factory.

The results thus far indicate that there is no serious problem from sulphur residues resulting from the use of sulphur compounds in the control of tomato psyllid.